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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,000	10/10/2003	Daniel A. Usikov	10020666-1	3446

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EXAMINER	
PATEL, JAYESH A	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
03/01/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	**Application No.** 10/684,000	**Applicant(s)** USIKOV, DANIEL A.	
	Examiner JAYESH PATEL	**Art Unit** 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *6/8/07 and decision of 11/24/10*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 12-20* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-10 and 12-20* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *10 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The reverse decision dated 11/24/2010 from the board is noted. In view of the newly found references Kawai et al. (US 5848114), Fessler et al. (NPL, IEEE 1057-7149, 1999) and Guan et al. (NPL 0031-9155/94/112005) the prosecution of the application has been reopened.

Specification

The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01. For example, para 0083 of the specification discloses a hyperlink in the last line.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 and 13-15 are rejected under 35 U.S.C. 102(b) as anticipated by Kawai et al. (US 5848114) hereafter Kawai.

1. Regarding Claim 1, Kawai discloses a method for processing 2D image data for reconstructing 3D image data in **(Figs 1-2)** therefrom, the method comprising: receiving a plurality of 2D images **(Figs1-2, Col 2 lines 42-58,Col 4 lines 58 through Col 5 lines 15)** acquired at different angles of view **(Col 5 lines 5-15 which discloses the scanner 3 turns by a preset microscopic angle for the whole circumference meeting the limitations of different angles of view)** and iteratively processing the received 2D images to reconstruct 3D image data therefrom at **(Col 2 lines 43-54 and Col 12 lines 9-55 which discloses iterative reconstruction means for forming a three dimensional image from the projection images (2D images))**.

2. Regarding Claim 2, Kawai discloses the method of claim 1 wherein said 3D image data comprises at least one cross section of an object under inspection **(Fig 2, Col 4 lines 58 through Col 5 lines 15 which shows cone beam method for acquiring the images of the cross-section of an object under inspection along the axis 9 and the image processing means 2 reconstructing the tomographic or 3D image from the projection images meets the limitations of the claim. Col 12 lines 43-55 disclose displaying the final reconstructed image of the vessel after the iterations finishes meeting the claim limitations of 3D image data of at least one cross section (cone beam image crossing through the body as seen in fig 2) of an object under inspection)**.

3. Regarding Claim 13, Kawai discloses a radiographic imaging system in **(Fig 2, Col 2 lines 42-54 and Col 4 lines 58 through Col 5 lines 15)** acquiring 2D images at different angles of view in **(Col 5 lines 5-15 which discloses the scanner 3 turns by a preset microscopic angle for the whole circumference meeting the limitations of different angles of view).**

4. Regarding Claim 14, Kawai discloses a cone beam tomography in **(Fig 2, Col 2 lines 42-54 and Col 4 lines 58 through Col 5 lines 15 discloses cone beam tomography)**.

5. Claim 15 is a corresponding system claim of claim 1. See the explanation of claim 1 and **(Fig 2, Col 2 lines 42-54 and Col 4 lines 58 through Col 5 lines 15)** where the means for limitations are disclosed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of NPL 0096-3003/94 by (Piccolomini et al.) hereafter Piccolomini.

6. Regarding Claim 7, Kawai discloses all the limitations of Claim 1. Kawai however does not expressly disclose determining the optimal regularization parameter.

Piccolomini determines the optimum regularization parameter on (**Page 3 Lines 1-10 and page 6 lines 1-14)**. Piccolomini and Kawai are combinable because they are from the same field of endeavor and are analogous art (computed tomography). The suggestion/motivation would be Piccolomini discloses that it is necessary to obtain a regularized solution before the convergence of the method by smallest number of iterations as explained on (**Page 3 Lines 1-10 and 6 Lines 1-14 by Piccolomini)**. Therefore it would have been obvious for one of ordinary skill in the art at the time the invention was made to have recognized the teachings of Piccolomini in the system and method of Kawai to obtain the claimed invention.

7. Regarding Claim 8, Kawai and Piccolomini discloses the method of claim 7. Piccolomini discloses the determination and using the optimal regularization parameter as explained in Claim 7 at (**Page 3 Lines 1-10 and page 6 lines 1-14)**. Piccolomini also discloses the best approximation of the number of iterations to converge as regularized on **(Page 3 Lines 1-4)**. The merits of Conjugate gradient as a regularization method depend on the determination of the optimal stopping iteration index k. Figures 3 and 4 show that after q iterations the solution will diverge.

8. Regarding Claim 9, see the explanation of Claim 7. Piccolomini further discloses using the L –curve method for the computation of optimal regularization parameter on **Page 6 line 13**.

9. Regarding Claim 10, Kawai discloses all the limitations of Claim 1. Kawai however does not expressly disclose the optimal number of iterations.

Piccolomini discloses determining the optimal stopping iterations on **page 3 lines 1-10**. The optimum numbers of iterations are necessary to decide when the method must be stopped before the divergence as recited on (**Page 3 Lines 1-10)**.

10. Regarding Claim 12, Kawai and Piccolomini discloses all the limitations of Claim 10. Piccolomini shows on **page 13 table 2 5-7th rows where the number of iterations are 5** meeting the claim limitations.

Claims 3,16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Fessler et al. (NPL , IEEE 1057-7149, 1999) hereafter Fessler et al.

11. Regarding Claim 3, Kawai discloses a method of claim 1. Kawai discloses iterative processing of the projection images as discussed in claim 1 except for the claimed “said iteratively processing comprises: processing the received 2D images in accordance with a conjugate gradient algorithm”.

Fessler discloses the iterative conjugate gradient algorithm in processing images **(Page 690 sections C and D disclose the conjugate gradient algorithm and the number of iterations meeting the claim limitations)**. **Page 697 table II** also shows the number of iterations. **Page 698** further suggests under the **discussion section VI** that the conjugate gradient method is also used for 2D, 3D and even 2.5D imaging. Fessler and Kawai are combinable because they are from the same field of endeavor and are analogous art of tomographic image reconstruction. The suggestion/motivation would be the use of conjugate gradient algorithm significantly improves the convergence rates with reduced number of iterations at **(page 698 Col 1 lines 1-30 and section VI discussion lines 1-6)**. Therefore it would be obvious for one of ordinary skill in the art at the time the invention was made to have recognized the teachings of using the conjugate gradient algorithm as taught by Fessler in the method of Kawai to obtain the claimed invention.

12. Claim 16 is a corresponding system claim of claim 3. See the explanation of claim 3. **Page 697** in Fessler shows the graphs of the CG algorithms and Table II shows the CPU time per iterations meeting the limitations of means for processing the images as per CG algorithm.

13. Regarding Claim 18, Kawai discloses a system in **(Figs 1-2)** for processing 2D image data for reconstructing 3D image data therefrom, the system comprising:

an imaging system operable to capture a plurality of 2D images **(Figs1-2, Col 2 lines 42-58,Col 4 lines 58 through Col 5 lines 15)** acquired at different angles of view **(Col 5 lines 5-15 which discloses the scanner 3 turns by a preset microscopic angle for the whole circumference meeting the limitations of different angles of view)** and iteratively processing **(reconstruction processor Fig 2 element 2)** the received 2D images to reconstruct 3D image data therefrom at **(Col 2 lines 43-54 which discloses iterative reconstruction means for forming a three dimensional image for the projection images (2D images)**. Kawai discloses iterative processing of the projection images **(Col 2 lines 43-54 and Col 12 lines 9-55 which discloses iterative reconstruction means for forming a three dimensional image from the projection images (2D images))** except for the claimed iteratively process the received 2D images to reconstruct 3D image data therefrom in accordance with a conjugate gradient algorithm.

Fessler discloses the iterative conjugate gradient algorithm in processing images **(Page 690 sections C and D disclose the conjugate gradient algorithm and the number of iterations meeting the claim limitations)**. Page 697 table II also shows the number of iterations. **Page 698** further suggests under the **discussion section VI** that the conjugate gradient method is also used for 2D, 3D and even 2.5 D imaging. Fessler and Kawai are combinable because they are from the same field of endeavor and are analogous art of tomographic image reconstruction. The suggestion/motivation would be the use of conjugate gradient algorithm significantly improves the convergence rates with reduced number of iterations at **(page 698 Col 1 lines 1-30 and section VI discussion lines 1-6)**. Therefore it would be obvious for one of ordinary skill in the art at the time the invention was made to have recognized the teachings of using the conjugate gradient algorithm as taught by Fessler in the method of Kawai to obtain the claimed invention.

Claims 4-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of NPL 0031-9155/94/112005 by Guan et al hereafter Guan.

14. Regarding Claim 4, Kawai discloses a method of claim 1. Kawai is silent and however does not expressly disclose wherein the 2D images are not required to be received in a pre-defined order.

Guan discloses the projections (2D images) access ordering of sequential and random (not in a pre defined order) ordering in the abstract and on page **2011 lines 11-35**. Guan further shows the MLS ordering (not in predefined order) in **Fig 6 page 2012** where the projections (2D images) are not in the defined order. Guan and Kawai are combinable because they are from the same field of endeavor and are analogous art (Tomographic reconstruction). The suggestion/motivation would be Guan discloses the scheme allows faster convergence **(page 2011 lines 29)**, optimal and easy to implement **(page 2012 line 14)** and yields reasonable reconstructions **(page 2012 lines 31-32)**. Therefore it would be obvious for one of ordinary skill in the art at the time the invention was made to recognize the teachings of Guan in the method of Kawai to obtain the claimed invention.

15. Regarding Claim 5, Kawai and Guan discloses a method of claim 4. Guan discloses sequential accessing scheme on **page 2012 lines 25-32, table 2 page 2013 and in abstract** meeting the limitations of processing the images as they are received.

16. Regarding Claim 6, Kawai and Guan discloses the method of claim 4. Guan discloses sequential accessing scheme on **page 2012 lines 25-32, table 2 page 2013 and in abstract** meeting the limitations of processing the images in the order in which they are received.

17. Claim 17 is a corresponding system claim of claim 4. See the explanation of claim 4.

Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Fessler and in further view of Guan.

18. Regarding Claim 19, Kawai and Fessler discloses the system of claim 18. Kawai and Fessler are however silent and do not expressly recite wherein the reconstruction processor does not require the 2D images to be received in a pre-defined order.

Guan discloses the projections (2D images) access ordering of sequential and random (not in a pre defined order) ordering in the abstract and on page **2011 lines 11-35**. Guan further shows the MLS ordering (not in predefined order) in **Fig 6 page 2012** where the projections (2D images) are not in the defined order. Guan, Kawai and Fessler are combinable because they are from the same field of endeavor and are analogous art (Tomographic reconstruction). The suggestion/motivation would be Guan discloses the scheme allows faster convergence **(page 2011 lines 29)**, optimal and easy to implement **(page 2012 line 14)** and yields reasonable reconstructions **(page 2012 lines 31-32)**. Therefore it would be obvious for one of ordinary skill in the art at the time the invention was made to recognize the teachings of Guan in the method of Kawai and Fessler to obtain the claimed invention.

19. Regarding Claim 20, Kawai and Fessler discloses the system of claim 18. Kawai and Fessler are however silent and do not expressly recite wherein the reconstruction processor does not require a pre-defined order of capturing said different angles of view.

Guan discloses the random order of the views at different angles on page **2011 lines 11-18** meeting the claim limitations of reconstruction processor does not require a pre-defined order of capturing said different angles of view.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAYESH PATEL whose telephone number is (571)270-1227. The examiner can normally be reached on 5-4-9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

1/5/2011
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